Chapter One

Promoting Prevention at EPA

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EPA Perspectives on Pollution Prevention

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When I joined EPA's Office of Prevention, Pesticides and Toxic Substances four years ago, I joined a team of pollution prevention advocates - a group of people with great ideas who were working hard to forward pollution prevention at the Agency. Shortly thereafter, the "reinvention fever" took over the Agency, as President Clinton and Vice President Gore announced their plans to fundamentally reinvent the way the federal government does business.

This push for greater change came in the context of both substantial progress in environmental protection and continuing challenges facing society. For example, while fewer cities were violating ambient air pollution standards, we learned that asthma was on the rise in children and young people - increasing by 42 percent between 1980 and 1987. Some experts suspect that environmental exposures are playing a role in this increase. The dichotomy between what has been accomplished and what remains to be done arises in virtually every environmental arena. Meanwhile, pressures on the environment are on the rise, in the United States and around the world. This situation highlights the strengths and the limitations of traditional regulatory approaches that have relied on end-of-the-pipe treatment and disposal technologies. It is leading scientists, engineers, researchers, industry, regulators, local officials, and many others to look for ways to prevent pollution in the first place.

The emphasis on pollution prevention in reinventing EPA programs respects the fact that society faces many challenges and that financial resources are limited. It also respects the fact that the environmental problems facing society are serious, long-term and fundamental to the health of the planet. Resources saved by preventing pollution, reducing red tape, and finding cost savings are resources that can be devoted to further environmental protection.

While at EPA, I have promoted a mission of expanding the public's right to know as a way to encourage pollution prevention. For example, my office has expanded the Toxics Release Inventory (TRI) significantly in the past three years. In 1994, we nearly doubled the number of chemicals on the reporting list. More recently, we proposed to add additional facilities to the TRI. And, we are considering a third phase of TRI expansion, focusing on identifying and filling additional data needs or "gaps" in the current TRI data that limit the public's ability to actively participate in environmental decision-making that affects their community. The Consumer Labeling Initiative is another important part of our efforts to promote the public's right to know. This project aims to teach us how to effectively present helpful environmental, safe use, health and other information on household consumer and pesticide product labels. In providing the public information about environmental and health risks through our right-to-know program, EPA aims to level the playing field so that all parties concerned about pollution, whether they are affected citizens or workers or representatives of government or industry, can discuss the issues openly, speak from a well-informed perspective, and, together, develop common-sense solutions. Multistakeholder involvement and public access to information at the local level are key features of the new, reinvented system of environmental management.

I believe strongly in the benefits that come from partnering with industry to achieve mutually advantageous environmental goals. The Office of Prevention, Pesticides and Toxic Substances has played a leadership role in coordinating voluntary programs across the Agency, in addition to managing our own Design for the Environment (DfE) partner-

ships, 33/50 Program, and the Pesticide Environmental Stewardship Program. Working closely with industry, professional organizations, and others, DfE has helped businesses incorporate environmental considerations into the design and redesign of products, processes, and technical and management systems. The 33/50 program has challenged 1,300 companies, operating more than 6,000 facilities nationwide, to reduce releases and transfers of 17 high priority TRI chemicals. They met that challenge a year ahead of schedule. The Pesticide Environmental Stewardship Program, a broad effort by EPA, the U.S. Department of Agriculture, and the Food and Drug Administration, fosters reduced pesticide use and risk in both agricultural and nonagricultural settings. By the year 2000, this program aims to have more than half of U.S. agricultural acreage adopt environmentally-safer integrated pest management programs.

The initiatives I have mentioned here are only a few of the prevention programs championed by my office. And they are only a small part of EPA's overall pollution prevention activities, which have grown significantly since the first Pollution Prevention National Report was published in 1991. As you will read in this chapter, all around the Agency, there is impressive work being done in prevention. As you learn about some of EPA's newer cross-program initiatives, like the Common Sense Initiative and Project XL, you will notice that our approach to environmental protection is fundamentally changing. This reinvention involves not only institutions, but individuals as well. The changes in course mean Americans throughout society have the opportunity and the responsibility to participate in environmental management decisions and to work creatively to prevent pollution that otherwise would contaminate lakes, rivers and groundwater, ambient air, and land. Renewed civic responsibility is taking place at the local, regional, and federal levels, and it is very exciting to watch.

It is equally exciting to me to note the contagious enthusiasm of new prevention advocates across the country. I want to take this opportunity to thank in particular the guest authors in this report, who contributed their time and energy to provide a diverse set of thoughtful and well-informed perspectives on pollution prevention. While this chapter describes how EPA's prevention program has grown and evolved in these last few years, the examples in the rest of this report and the comments of our guest authors demonstrate how enthusiasm for preventive approaches has taken hold in industry, other parts of the federal government, state and tribal governments, communities, non-profit organizations, and universities. With the commitment of these groups to further institutionalize pollution prevention as the nation's preferred environmental protection strategy, I am optimistic that together we will continue to see pollution prevention success as we enter the 21st century.

Introduction

EPA's pollution prevention program began in earnest in the late 1980s. The goal of this program was to add a top step to the U.S. environmental management hierarchy — to promote prevention as the preferred environmental protection approach before implementing traditional control and clean up approaches. On Earth Day 1993, EPA Administrator Carol Browner identified pollution prevention as "the principle of first choice" and the new central environmental ethic for all EPA programs. As part of its response to Vice President Gore's National Performance Review, EPA accelerated efforts to integrate pollution prevention into all environmental regulations, policy, and guidance.

This chapter describes some of EPA's pollution prevention initiatives concentrating on how EPA's pollution prevention program, as a whole, has grown since the 1991 Pollution Prevention National Report. The initiatives can be categorized into seven different themes identified by Administrator Browner in her 1993 Pollution Prevention Policy Statement to EPA staff. These themes are listed in the box below.

Themes Characterizing EPA's Pollution Prevention Activities:

1. Incorporating prevention as the principle of first choice into the mainstream of the Agency.
2. Helping to build and facilitate a national network of prevention programs, particularly among states and local governments.
3. Identifying and pioneering new environmental programs that emphasize cross-media prevention, reinforce the mutual goals of economic and environmental well-being, and represent new models for government/industry interaction.
4. Establishing new federal partnerships to promote prevention within the national government.
5. Generating and sharing environmental information to promote prevention, track progress through measurement systems, and better empower consumer decisions.
6. Developing partnerships in technological innovation with the private sector to increase industrial competitiveness and enhance environmental stewardship.
7. Seeking changes, where justified, in federal environmental laws to encourage pollution prevention/source reduction.

Towards the end of the chapter, we provide some examples of how EPA's regional offices have worked with state and local governments and other organizations to develop and implement pollution prevention projects in the regions.

Theme 1: Incorporate prevention as the principle of first choice into the mainstream work of the Agency.

In 1992, EPA began a concerted effort to evaluate pollution prevention options for numerous new regulations it had under development. Calling its efforts the *Source Reduction Review Project (SRRP)*, EPA asked its media offices to identify multimedia and pollution prevention approaches that could be used in developing and implementing a number of air, water, and solid waste regulations.[1] In February 1996, EPA published an assessment of the SRRP experience. The assessment identifies the successes and obstacles encountered in SRRP and makes a number of recommendations. On the success side, EPA identified pollution prevention approaches in numerous SRRP rules that are partially or wholly adequate for compliance. EPA also found ways to increase flexibility in some instances by adding innovative incentives in the rules to encourage businesses to choose pollution prevention/multimedia approaches. These incentives allow companies to find the least-cost ways of meeting standards, and will enable many facilities to achieve better environmental results.

Some specific examples of success in promoting multimedia and pollution prevention approaches through regulations are:

- EPA's Pesticide Formulating, Packaging and Repackaging Effluent Guideline (a water rule, promulgated September 30, 1996). This is EPA's first rule to offer industry two limits to choose from: (1) a zero-discharge limit, based on benefits solely to water; or (2) a pollution prevention allowable discharge limit, based on benefits to all media. Choosing the latter will be cheaper for some facilities and will result in fewer total loadings to the environment.

- EPA's historic effort regarding pulp and paper mills provides a model for allowing EPA and its stakeholders to evaluate the cross-media effects of air and water regulatory options at one time. This has facilitated the exchange of data, perspectives, and innovative ideas in a context broader than a single-medium rulemaking. The promulgation of the first of these rules (subcategorized by type of mill) is anticipated in 1997.

- EPA's Carbamates Hazardous Waste Listing (promulgated February 1995) identified significant unregulated air releases, uncovered through cross-media analysis. The Listing created a concentration-based exemption for waste streams related to the air releases, so as to encourage waste minimization of the chemical being released to air.

[1] EPA, Office of the Administrator and Office of Pollution Prevention and Toxics.*Source Reduction Review Project* (EPA 100/R-92/002, August 1992) The SRRP was assessed in*Preventing Pollution Through Regulations: The Source Reduction Review Project, an Assessment* (EPA 742-R-96-001, February 1996).

These new regulatory approaches are generally not as familiar to regulated entities as the more traditional command-and-control approaches. Accordingly, EPA wants to keep working in this area to expand these innovations to more rulemakings, and to highlight the opportunities for better environmental performance and flexibility when implementing specific regulations.

Since the publication of its SRRP Assessment, the Agency has been moving forward to expand on its successes and to work on overcoming the institutional obstacles to pollution prevention and multimedia approaches identified in the Assessment. In September 1996, six Office Directors from across EPA regulatory programs met to identify next steps. By March 1997, this group had expanded to more than ten when they met as the "EPA Office Directors' Pollution Prevention Forum." As a result of this meeting, they reached agreement on a list of agency regulatory and programmatic activities that are or will be targeted as priority pollution prevention projects. This is an interim list and subject to change, depending on the results of data gathering in numerous rulemakings.

In a step beyond SRRP, this list addresses both regulatory and programmatic activities, and is designed to capture a more complete picture of the strategic opportunities for pollution prevention in the Agency's core work. It is hoped that this will lead to a more synergistic interaction among various Agency programs in pollution prevention. It is anticipated that, by taking a more expansive view — i.e., possibly combining regulatory, programmatic, and maybe research and voluntary strategies — the Agency may be able to surmount some of the obstacles encountered when promoting pollution prevention in a solely regulatory mode, coordinate more effectively internally, and achieve more for pollution prevention nationally.

Prevention benefited when the Agency in 1994 reorganized its enforcement programs and created the *Office of Enforcement and Compliance Assurance (OECA).* This reorganization consolidated the Agency's enforcement activities under one program and provided a basis for a new approach to enforcement that promotes and supports pollution prevention. This new approach will allow EPA to maintain an imposing enforcement presence as a means of deterrence, but also view traditional enforcement as one of a number of tools for achieving the broader goal of compliance. It will also allow EPA to organize national compliance strategies around economic sectors, ecosystems, and other entities to best reflect real-world environmental problems and pursue whole-facility, multimedia strategies whenever feasible.

Already OECA has seen numerous accomplishments in incorporating pollution prevention in its enforcement and compliance programs. Examples of these accomplishments include:

- The development of Compliance Assistance Centers for four industry sectors (automotive service and repair shops, metal finishing, agriculture, and printing). The Office of Compliance, within OECA, is developing these multimedia, sector-oriented centers to provide "one-stop shopping" for businesses to obtain comprehensive, easy-to-understand information on regulatory requirements and

pollution prevention technologies. In addition, since the Office of Compliance is organized around commercial sectors rather than by individual environmental medium, the Office will be able to take an industry sector perspective to ensure that EPA programs and requirements fit together, are understandable, and favor pollution prevention. Other Compliance Assistance Centers are under development.

- A recently initiated program to incorporate pollution prevention into enforcement settlements through the use of Supplemental Environmental Projects (SEPs).
- The Federal Facilities Enforcement Office (FFEO) within OECA, together with EPA's Office of Pollution Prevention and Toxics (OPPT), published the *Federal Facility Pollution Prevention Planning Guide* to help federal facility environmental coordinators strengthen their environmental programs using pollution prevention approaches and comply with the pollution prevention planning requirements of Executive Order 12856.
- FFEO conducted more than 30 multimedia inspections at federal facilities. FFEO targeted facilities that had environmental compliance problems that could be addressed using pollution prevention and whose processes lent themselves to pollution prevention solutions that could be used as prototypes for other federal facilities.[2]

The goal of the Common Sense Initiative is a cleaner environment at less cost to taxpayers and industry.

The *Common Sense Initiative* (CSI) is EPA's most visible effort to create a prevention-oriented framework for environmental protection on an industry-by-industry basis. CSI operates by sector subcommittees composed of representatives from industry, environmental justice, labor, and environmental organizations, and federal, state, and local governments. Six industries are serving as pilots in this program: automobile assembly, computers and electronics, iron and steel, metal plating and finishing, petroleum refining, and printing. The six sector teams were convened to examine the full range of environmental requirements. Each team is looking for opportunities to change complicated or inconsistent environmental requirements into comprehensive strategies for environmental protection, with an emphasis on pollution prevention, instead of pollution controls. Innovation and flexibility are being encouraged. The goal is a cleaner environment at less cost to taxpayers and industry.

EPA's Regional Program Management has been important to the "mainstreaming" of prevention. Nearly every region has found important ways to encourage pollution prevention and multimedia approaches in its management activities. For example, Region I's *New England Environmental Assistance Team* is a self-directed team established in 1995 to provide comprehensive, multimedia compliance and pollution prevention assistance to selected sectors of the regulated community. Region IV is devel-

[2] EPA, Office of the Administrator. *EPA Pollution Prevention Accomplishments: 1994 — Incorporating Pollution Prevention Into Business Decisions* (EPA 100-R-95-001, Spring 1995).

oping a new comprehensive Regional Pollution Prevention Strategy that engages all regional core media programs in creating and conducting pollution prevention activities in mainstream activities. Region V's cross-program Pollution Prevention Team has created a "Waste Reduction in Our Workplace" initiative to further waste reduction activities within day-to-day regional activities, such as implementing pollution prevention-friendly contracts. In Region VII, pollution prevention support funds provide interns to the regional media programs for pollution prevention through a competitive selection process.

In its *Pollution Prevention in Permitting Pilot Project*, Region X partnered with Intel Corporation, the world's largest semiconductor manufacturer, to develop a model Clean Air Act Title V operating permit that incorporates both pollution prevention and permit flexibility. Region VI has begun similar work in this area with the Oklahoma Department of Environmental Quality and Imation Enterprises.

Theme 2: Help build and facilitate a national network of prevention programs, particularly among states and local government.

EPA recognizes that a key component in making pollution prevention the nation's top priority in environmental protection is support for state and local government efforts in the pollution prevention arena. The Agency has focused its efforts on building and facilitating a national network of prevention programs that assist state and local regulators in promoting pollution prevention initiatives. The cornerstones of this support to states and local governments are: (1) EPA funding of state and local pollution prevention projects, (2) dissemination of pollution prevention related information and technical assistance, and (3) combined participation of federal, state, and local environmental leaders in supporting prevention as a main focus of achieving environmental protection.

Funding Support

Through the *Pollution Prevention Incentives for States* (PPIS) grant program, EPA provides $5-8 million each year — a total of over $35 million since 1988 — for state and tribal, local, and community pollution prevention programs and initiatives. The goal of the PPIS grant program is to assist businesses and industries in identifying pollution prevention strategies and solutions for complying with environmental regulations. EPA's *Environmental Justice through Pollution Prevention* grants assist community-based groups in developing collaborative approaches to achieving environmental justice through pollution prevention. In 1995, EPA awarded $4.2 million to support this program. In 1996, these grants were funded at $1.9 million, but funds rose again to $4.2 million in 1997.[3]

[3] EPA, *Pollution Prevention News* (September/October 1995 and October/November 1996).

While these focused grants provide substantial support to the pollution prevention programs of state and localities, they are dwarfed in size by the annual $650 million program development grants provided by EPA's media programs. EPA guidance now encourages pollution prevention solutions in various program support and operating grants provided to states each year.

In addition, great potential exists for funding pollution prevention activities with the new *Performance Partnership Grants (PPGs)* and the related *National Environmental Performance Partnership System (NEPPS).* PPGs and NEPPS are new Agency initiatives born out of a joint State/EPA Task Force on State Capacity in 1993. This task force recommended that EPA and the states adopt a systematic approach to increase state capacity and allow for the management of state programs in a way that allows each level of government to contribute according to its respective strengths. In February 1995, President Clinton announced a "Performance Partnership" proposing that the states be allowed the option of combining funds from individual EPA programs in order to achieve improved program performance. Six states signed pilot Environmental Performance Agreements with EPA for FY 96. Approximately 30 states are working with their respective EPA Regional Offices to negotiate Performance Partnership Agreements for FY 97.[4]

Dissemination of Information and Technical Assistance

In order to assist states and local governments in achieving compliance with environmental regulations, and to help promote prevention-oriented programs in general, EPA has established several programs that provide current pollution prevention information and solutions from around the world. Leading these programs is *EPA's homepage* (http://www.epa.gov), from which users can access information on all of EPA's pollution prevention programs, and *Enviroene* (http://es.inel.gov/envirosense/), which provides users with information on pollution prevention technologies, procedures, and experience across federal agencies, other governmental organizations, manufacturers, suppliers, researchers, and others. At the heart of *Enviroene* is immediate access, via the Internet, to pollution prevention contacts, including question and answer exchanges with environmental professionals world-wide, training materials, databases, regulations, and the most recent prevention technologies.

The Pollution Prevention Act authorizes EPA to work with states to facilitate the use of source reduction techniques by businesses in those states. EPA is in the process of developing a national network of information centers around the country. The goal of the network is threefold: (1) create new state pollution prevention centers for the collection, synthesis, and dissemination of information within the state; (2) support existing regional information centers; and (3) coordinate work among the new and existing centers to reduce duplication of effort and facilities training for the promotion of pollution prevention technologies. The network will also establish informa-

[4] Performance Partnership Fact Sheet on EPA's homepage "www.epa.gov/states."

tion standards and peer review to ensure that the information is correct and up-to-date. In addition, the network will provide pollution prevention technologies information, not only to state technical assistance staff, but to other small business assistance programs such as the Small Business Development Centers and the National Institutes of Standards and Technology Manufacturing Extension Partnerships. Functions performed by the network will include: making information accessible and easy-to-search, collecting and updating technical information, identifying and maintaining a list of experts and other sources of information, and providing a standardized format for information such as case studies, bibliographies, processes, and vendor information. EPA is using a competitive grant format to identify eligible and interested states. By facilitating access to regional and other states' information, the participating states may then focus their efforts on meeting the specific needs of industries in their communities and may also be able to specialize in the type of assistance they provide.

Federal/State/Local Government Partnerships

Bringing together federal, state, and local government environmental leaders is another goal of EPA's pollution prevention program strategy. EPA has implemented many pollution prevention initiatives that attempt to encourage and support a partnership between the Agency and state and local groups. As an example, EPA provides support to the National Pollution Prevention Roundtable, an association comprised of state, local and other pollution prevention programs, and has supported the National Association of Counties (NACO) as it works to introduce elected county officials to pollution prevention. The Agency has recently established agreements and projects with county and city public health officials, physicians, and others who believe pollution prevention is also disease prevention and who can have an immediate impact on local communities.

In addition, for the past five years, EPA has provided support to the *Forum on State and Tribal Toxics Action* (FOSTTA). FOSTTA consists of toxics and prevention staff at the state and tribal level who share experiences with OPPT staff in an open forum several times a year.

EPA regions, working with states, are also developing multi-regional initiatives. *The Tri-State Geographic Initiative*, led by Region III, is a multimedia environmental study involving the states of Kentucky, Ohio, and West Virginia, EPA Regions III, IV, and V, the Ohio River Valley Water Sanitation Commission, and local environmental agencies, whose purpose is to identify pollution prevention approaches to reduce pollution sources in the tri-state area, addressing both businesses and citizens as sources of pollution and as partners in prevention. *The Great Lakes Regional Pollution Prevention Roundtable*, led primarily by Region V and involving eight states and Ontario, has created a powerful regional pollution prevention information and assistance mechanism to help states better address regulatory and other environmental challenges.

Theme 3: Identify and pioneer new environmental programs that emphasize cross-media prevention, reinforce the mutual goals of economic and environmental well-being, and represent new models for government/industry interaction.

Over the last several years EPA has created an array of partnership programs designed to promote prevention by challenging businesses and other partners to set and meet voluntary pollution prevention goals and commitments. These partnerships with businesses, citizen groups, state and local governments, and educational groups provide new models for government/industry interaction and are achieving more cost-effective solutions to environmental issues than traditional regulatory approaches.

EPA's voluntary programs, collectively referred to as *Partners for the Environment*, demonstrate that voluntary goals and commitments achieve real environmental results in a timely and cost-effective way.[5] The results of the Partners for the Environment efforts are impressive. Thousands of organizations are working cooperatively with EPA to set and reach environmental goals such as conserving water and energy and reducing greenhouse gases, toxic emissions, solid wastes, indoor air pollution and pesticide risk. More than 6,000 participants from every major sector of the economy — from Fortune 500 companies to small shop owners — were involved in Partners for the Environment programs in 1995.

Together, EPA's Partners for the Environment programs have:

- reduced toxic emissions by 750 million pounds;
- eliminated 1.8 million tons of solid waste in one year; and
- reduced greenhouse gas emissions by preventing 13.4 million metric tons of CO_2 emissions in 1995.

These programs do not just reduce pollution; they also save energy. The Partners for the Environment programs saved 110 trillion BTUs in 1995 — enough to light 11 million households for a year. The success of these programs is growing dramatically. By the year 2000, with continued participation from even more partners, these pollution prevention numbers are expected to triple.

The voluntary partnerships fostered by EPA's programs are not just good for the environment, they make good business sense and prove that pollution prevention pays. Together, these partners saved $435 million in 1995 and expect to save $7 billion

[5] EPA, Office of the Administrator. *Partnerships in Preventing Pollution: A Catalogue of the Agency's Partnership Programs* (EPA 100-B-96-001, Spring 1996).

annually by the year 2000. Below are examples of some of the Agency's partnership programs:

- *Climate Wise Recognition Program* is a joint EPA/ Department of Energy voluntary pledge program that encourages private industry and others to adopt flexible, comprehensive approaches to reducing greenhouse gas emissions. The program provides technical assistance and puts companies in touch with financial services to "jump start" energy efficiency and pollution prevention actions. With 13 charter companies, Climate Wise companies already represent almost 4 percent of U.S. industrial energy use. Climate Wise participants expect to save more than $80 million annually by the year 2000.

- *Green Lights*, an EPA program designed to prevent pollution by encouraging U.S. institutions to use energy-efficient lighting technologies. EPA forms partnerships with individual institutions, including both public and private organizations, and asks participants to develop 5 year action plans for reducing energy consumption through more efficient lighting technologies. Inspired by the success of Green Lights, EPA introduced Energy Star Buildings, a program that takes pollution prevention to new heights. Enjoying the same rapid growth as Green Lights, Energy Star Buildings allow participants to maximize profitability, increase productivity, and improve occupancy comfort through increased energy efficiency. To date, Green Lights and Energy Star Buildings participants have distinguished themselves by preventing more than 4.5 billion pounds of greenhouse gas emissions per year (equivalent to removing 480,000 cars from the road); and saving more than $250 million per year (reducing operating costs, making organizations stronger and more competitive, and reinvesting in the American economy).

- *WasteWi$e* is a voluntary partnership between EPA and U.S. companies aimed at reducing inefficient materials use and thus reducing municipal solid waste, and conserving energy and natural resources. Through this program, firms establish cost-effective goals of their choice to reduce their municipal solid waste through prevention, recycling, and by buying or manufacturing recycled products. Since the program's inception, more than 500 companies have participated and have saved millions of dollars through prevention and recycling of their waste. WasteWi$e partners conserved nearly 344,000 tons of materials through waste prevention activities in 1995 – a 40 percent increase

A Voluntary Partnership Program Success Story

The *33/50 Program*, EPA's first voluntary pollution prevention reduction initiative, challenged corporate America to voluntarily reduce toxic emissions of 17 toxic substances by 33 percent in 1992 -- a target which many participating firms met or exceeded -- and by 50 percent in 1995. EPA received 1,300 individual commitment letters from companies that agreed to reduce emissions of these toxic substances by 50 percent in less than five years. Data from the 1994 Toxics Release Inventory (TRI) show that more than 750 million pounds of toxic waste have been eliminated by 33/50 participants, allowing the 33/50 program to claim success in meeting its 1995 goal a year early. This program was a recipient of Vice President Gore's Hammer Award for helping government work better and cost less.

over 1994 figures. In addition, partners quadrupled the reported amount of materials collected for recycling to more than four million tons. WasteWi$e partners also reaped significant cost savings. In avoided disposal tipping fees alone, the amount of waste reduced represents a potential savings of more than $143 million.[6] Again, this voluntary partnership program clearly demonstrates the cost benefits of incorporating prevention programs into American businesses. Both the "bottom line" and our nation's environment are improved. A related program, the *Waste Minimization National Plan,* targets prevention of hazardous waste. The Plan's goal is to reduce persistent, bioaccumulative, and toxic chemicals in hazardous waste by 50 percent by the year 2005.

- *Design for the Environment* (DfE), through collaborative ventures, promotes the design of safer products and processes in areas such as dry cleaning, screen printing and electronics, and harnesses environmental information to advance new prevention approaches and technologies among business and industry. This program utilizes EPA's expertise and leadership to facilitate information exchange and research on pollution prevention efforts. DfE works with businesses, trade associations, and other stakeholder industries to evaluate the risks, costs, and performance of alternative chemicals, processes, and technologies. In addition, DfE helps individual businesses apply specific tools and methods to undertake environmental design efforts.

- The Agency's *Environmental Accounting Project*, a collaborative effort with business, academia and others, promotes sound management accounting and capital budgeting practices which better address environmental costs. The project encourages and motivates business to understand the full spectrum of environmental costs, and integrate these costs into decision making. Currently, the project has over 650 members who are actively participating or interested in environmental accounting. Implementing environmental accounting will make environmental costs more visible to company managers, thus making those costs more manageable and easier to reduce. The project has produced numerous tools, such as P2/Finance software, that help companies incorporate environmental costs into their capital budgeting decisions.[7]

- *The Pesticide Environmental Stewardship Program* (PESP) is a voluntary public-private partnership of EPA, the Department of Agriculture, the Food and Drug Administration, and groups that use or influence the use of pesticides. The program's goals are to develop specific use/risk reduction strategies that include reliance on biological pesticides, integrated pest management, and other

[6] This figure is based on an average 1995 U.S. tipping fee of $32.19 per ton, a value reported by *Solid Waste Digest* in 1995.

[7] EPA, Office of Pollution Prevention and Toxics. *Stakeholder's Action Agenda: A Report of the Workshop on Accounting and Capital Budgeting for Environmental Costs* (EPA 742-R-94-003, December 5-7, 1993).

safer approaches to pest control. Voluntary partnerships with PESP will significantly contribute to the Clinton Administration's goal that 75 percent of U.S. agricultural acreage adopt integrated pest management practices by the year 2000. PESP currently has 48 partners and 10 supporters (organizations that influence pesticide use) that represent 45,000 pesticide users. Each partner has agreed to develop and implement formal strategies to reduce the use and risk of pesticides and to tailor pesticide use to specific sites, crops, and regions of the country.

- *Water Alliances for Voluntary Efficiency* (WAVE) is another voluntary program similar to *Green Lights*, that is dedicated to achieving water use efficiency. Currently, hotel and motel chains are targeted for participating in the program, but other groups such as hospitals and schools will soon be involved as well. The primary goals of WAVE are to reduce water and energy consumption through the installation of water-efficient equipment, linking water-use efficiency to reduced costs, and educating business staff and the public on the benefits of reduced water use. The 26 hotel chains now participating in the program have each signed a Memorandum of Understanding with EPA agreeing to develop and implement a plan for reducing water consumption at their facilities. Businesses participating in the program are expected to cut water use by up to 30 percent and on average, recover the costs of investments in water-efficient equipment in just 3 years or less.

- In 1995, President Clinton launched *Project XL*, a program designed to encourage development of alternative strategies to achieve greater environmental benefits over current regulatory programs. As part of Project XL, EPA is creating partnerships with states to provide a limited number of companies with the opportunity to demonstrate their environmental excellence and leadership. These companies will be given the opportunity to modify or replace current regulatory system requirements at specific facilities with company-developed alternative, flexible strategies. Each alternate strategy must meet a number of conditions, including: (1) it must produce environmental performance superior to that which would be achieved by full compliance with current laws and regulations; (2) it must be "transparent" so that citizens can examine assumptions and track progress toward meeting promised goals; (3) it must not create worker safety or environmental justice problems; (4) it must have the support of the community surrounding the facility; and (5) it must be enforceable. EPA expects that the program will increase flexibility in adopting innovative prevention-oriented solutions to environmental problems, improve compliance and increase use of new technologies, and encourage a more cooperative relationship among regulators, regulated businesses, and the community.

- *The Merit Partnership for Pollution Prevention (Merit)* is a cooperative venture of the public and private sectors. Merit, which was initiated by EPA Region IX in 1993, is led by a Steering Committee made up of EPA, industry, and other government representatives; and a Community Advisory Panel

"One of my favorite DILBERT™ cartoons says "Change is a good thing -- you first." [*Project*] *XL* is an experiment in leadership in a leadership-adverse world."

- Charles McLean, founder of the Aspen Institute's Series on the Environment in the 21st Century

Two Examples of XL Projects:

1) Intel Corporation Proposes a Multi-media Operating Plan

The Intel Corporation signed a Final Project XL Agreement in November 1996, beginning the implementation of a multi-media environmental master plan at its Ocotillo, Arizona semiconductor facility. The Final Project Agreement was developed by a stakeholder team with intense public participation, including public hearings and a national comment period. The plan commits Intel to:

- reducing hazardous, solid and non-chemical hazardous waste;
- reducing fresh water consumption;
- using health-based guidelines for limits on emissions of hazardous air pollutants; and
- exceeding current zoning setbacks for its facilities; and
- maintaining a cap on air emissions below the minor source level, even if a new facility is built on the site.

Implementation of these project goals will allow Intel to modify production processes without revising its air permits if emissions are below permit levels and make operational changes if the aggregate limit for air pollutants is not exceeded and the varying levels do not exceed health-based guidelines. Participation in Project XL will help Intel increase its operational flexibility and shorten time-to-market delays.

2) City of Anaheim Proposes Prevention Activities

In exchange for committing to certain voluntary actions, the City of Anaheim, California, is seeking relief from monitoring requirements for the Acid Rain Program. This Project XL for Communities Proposal (currently in the development phase) requires the City to close abandoned wells that currently threaten to contaminate drinking water supplies, implement a chlorinated solvents reduction program with local businesses, and implement demonstration projects for innovative technologies that reduce use of hazardous chemicals.

consisting of private citizens and community and environmental organization representatives. Merit's mission is to develop and promote pollution prevention practices and technologies that both protect the environment and contribute to economic growth. Merit does this primarily by developing and facilitating the implementation of pilot projects that demonstrate new and innovative pollution prevention practices and technologies. Merit projects vary widely in scope of effort and in the industries involved, but the one criterion they all have in common is a focus on the environmental and economic impacts of the technology or practice being tested.

In Region I, the *CLEAN* Program capitalizes on OECA's new small business and audit policies to help promote industry/state/EPA partnerships, initially with metal finishers in Maine and New Hampshire. Region I's Environmental Capital Network creates a private sector partnership to help new pollution prevention and recycling companies improve their business plans in order to attract venture capital.

The *Great Printers Project* in Region V has enlisted the Council of Great Lakes Governors, the Printing Industries of America, the Environmental Defense Fund, EPA, and state environmental and technical assistance agencies to make pollution prevention the standard practice in the printing industry. Region II has also targeted the printing

sector in the New York City area by engaging the New York State Department of Environmental Conservation, other state agencies, and printing trade associations in a Seminar Series for Printers.

Under its *South Phoenix Pollution Prevention Project for Metal Finishers*, Region IX has partnered with the State of Arizona, the Lawrence Livermore National Laboratory, the City of Phoenix, and the local chapter of the American Electoplaters and Surface Finishers Society to provide pollution prevention technology transfer to metal finishers, first reaching those located in an environmental justice community and then more broadly around the state.

The programs described above are just a few of the many successful voluntary partnership programs that EPA has initiated in the last 5 years. These programs are in effect new models for government/industry interaction in environmental protection. As demonstrated, these programs are achieving remarkable results in preventing environmental degradation and at the same time are economically beneficial to U.S. industries and the American people.

Theme 4: Establish new federal partnerships to promote prevention within the national government.

EPA is establishing partnerships with other federal departments and agencies to promote pollution prevention both within federal government facilities and within federal regulatory and guidance programs. Many federal departments and agencies are now managing major prevention-oriented federal environmental initiatives.

Several Executive Orders signed by President Clinton require federal facilities to report emissions, to take a leadership role in recycling, and under guidance from EPA, to identify and procure "environmentally-preferable products."[8] EPA's guidance on environmentally-preferable products (EPP), published in the *Federal Register* on September 29, 1995, launched a national debate on "green procurement" principles.[9] Included in the guidance are seven general guiding principles designed to help executive agencies begin the process of identifying and purchasing environmentally-preferable products and services. The guidance also recommends implementation activities for executive agencies, such as issuing policy directives and applying the principles to acquisition. Ultimately, the goal is to establish the federal government, through its enormous purchasing power, as a leader in pollution prevention by creating of a strong

Spending $200 billion annually, the federal government can apply its purchasing power to create a demand for products and services that have a reduced impact on the environment.

[8] "Environmentally-preferable" products and services have a lesser or reduced effect on human health and the environment when compared to other products and services that serve the same purpose. Executive Order 12783, Sections 201&503 (October 20, 1993).

[9] EPA, Office of Pollution Prevention and Toxics. *Environmentally Preferable Products - Proposed Guidance* (EPA 744-94-002, September 1995) and EPA, Office of Pollution Prevention and Toxics. "Guidance on Acquisition of Environmentally Preferable Products and Services; Solicitation of Comments," *Federal Register* 60 (189) (September 29, 1995).

market for "green" products. Two of the environmentally-preferable purchasing pilot projects that have been launched involve acquiring cleaning products and construction products. In both of these projects, EPA is partnering with other federal agencies (the General Services Administration and the Department of Defense, respectively) to couple its environmental knowledge with other agencies' acquisition expertise.

Executive Order 12856, signed by President Clinton in August 1993, requires federal facilities owned and operated by federal agencies to report annually to the Toxics Release Inventory (TRI). This reporting will ensure that the public has access to information on the releases and transfers of toxic substances from these facilities and ensures that the federal government is a good neighbor in the communities in which it operates. In essence, the Executive Order extends private sector reporting requirements to all federal facilities and directs each federal agency to voluntarily decrease its toxic releases and off-site transfers by 50 percent using 1994 (the first reporting year) as the baseline. Over 190 federal facilities are subject to TRI reporting. (Further information on TRI reporting for federal agencies may be found in Chapter 3 of this report.)

Partnership programs between federal agencies are also instrumental in fostering pollution prevention programs that serve the clients of the agencies. One example of such a partnership is *Agriculture in Concert with the Environment* (ACE), a joint grant program funded equally by EPA and USDA's Sustainable Agriculture Research and Education (SARE) Program. The goals of this competitive grants program are to promote agricultural practices and systems that are environmentally sound, economically viable, and resource conserving. In 1997, ACE will be funded nationally at $225,000.

EPA also provides technical assistance to federal departments or agencies seeking assistance in establishing internal pollution prevention programs. Many federal programs, EPA guidance, case studies, and other pollution prevention initiatives are available to federal agencies and are easily accessible via EPA's *Enviroene* Web site (see discussion earlier in this chapter).

The National Park Service Project in EPA's Region VIII has leveraged the pollution prevention expertise of the region and the resources of the National Park Service to successfully reduce or eliminate solid and hazardous waste streams in more than 35 national parks, thereby both lowering ecological risks and saving millions of dollars. In its environmental workshops, the Long Island Postal Service collaborates with EPA Region II to present information on the benefits of pollution prevention gathered from several pollution prevention opportunity assessment done under a previous Region II initiative.

Theme 5: Generate and share environmental information to promote prevention, track progress through measurement systems, and better empower consumer decisions.

A central element of EPA's pollution prevention strategy is motivating industries to prevent pollution by empowering citizens and consumers with environmental information.

Section 313 of the 1986 Emergency Planning and Community Right-to-Know Act (EPCRA) and section 6607 of the Pollution Prevention Act of 1990 require certain manufacturers to report to EPA annually the quantities of toxic chemicals they release to the environment and the amounts of waste managed on-site or transferred off-site for management elsewhere. EPA compiles this information and shares it with the public annually as the Toxics Release Inventory (TRI). TRI also asks questions of industry about source reduction, energy recovery, and treatment and disposal activities. By making these data public, TRI provides a strong incentive for companies to reduce wastes. TRI milestones include:

- The 1995 TRI data, announced in May 1997, showed that reported industrial releases declined by 45.6 percent (1.35 million pounds) from 1988. Of the 21,951 facilities that reported to TRI for 1995, nearly 29 percent reported implementing at least one source reduction activity.[10]
- In 1994, EPA added 286 additional chemicals and chemical categories to the TRI, giving the public a broader picture of progress in preventing toxic waste generation and release.
- In 1997, EPA expanded by 30 percent the number of industrial facilities required to report to TRI, to include the categories of metal mining, coal mining, electric utilities, commercial hazardous waste treatment, petroleum bulk terminals, chemical wholesalers, and solvent recovery services. In addition, 700 chemical manufacturing facilities which already report right-to-know information to the TRI, will also be required to report on additional types of pollution, such as hazardous waste treatment activities.
- EPA has reported to the President the benefits that chemical use reporting (materials accounting) would have on community right-to-know laws, and has

> "Since pollution prevention is motivated in part by public information, one of EPA's most important tasks is to collect and disseminate user-friendly data that measures progress in reducing waste at its source."
>
> -- EPA Pollution Prevention Policy Statement

[10] These numbers are taken from an initial comparison of 1995 data with the 1988 TRI baseline year as reported in EPA, Office of Pollution Prevention and Toxics.*1995 Toxics Release Inventory, Public Data Release* (EPA 745-R-97-005, April 1997) and 61*Federal Register* 51322 (October 1996). The second phase of the data release will occur in Fall 1997 and will serve to provide a more in-depth look at the data and the trends. This second phase will include the publication of an industry sector-based analysis of trends as well as the publication of a comprehensive guide to TRI data use. The sector-based approach will compare like facilities to each other and will allow for a sector-based assessment of future prevention and technology needs. This sector-based approach will also allow for goal-setting within sectors and across facilities.

How to Obtain TRI Reports and Data Products

Product	Supplier	Contact Information
1995 TRI Public Data Release (annual report)	EPA	EPCRA Hotline (800) 535-0202 or (703) 412-3333 (fax only)
TRI Information Kit (EPA 749-F-94-002)	NCEPI	(513) 489-8180 (800) 490-9198

Accessing TRI Data Online

Data from Online Providers	Internet Address	Special Notes
Right-to-Know Network (RTKNET)- Provides public access to TRI and related environmental databases to community groups concerned about toxics. For more information call (202) 797-7200	ftp://ftp.rtknet.org gopher://gopher.rtknet.org http://www.rtk.net	Set computer parameters to 8,N,1 and log in as "public." No charge for Internet access. Direct access by modem at (202) 234-8570; phone charge may apply.
National Library of Medicine (NLM) - Offers state of the art, user friendly searching of complete TRI database. For more information call (301) 496-6531.	toxnet.nlm.nih.gov	$18-20 per hour charge. Password required.
EPA Internet Server - Access a variety of reports, data files and TRI information from EPA. For more information call TRI-US at (202) 260-1531.	ftp://ftp.epa.gov gopher://gopher.epa.gov http://www.epa.gov/opptintr/tri	

begun an open process to determine how this might best be accomplished, including issuing an Advanced Notice of Proposed Rulemaking in October 1996.

- In 1994, under the direction of Executive Order 12856, EPA began to collect (for the first time) toxics release data from federal agencies.

EPA's new *Consumer Labeling Initiative* (CLI), is examining ways to provide better environmental information on products to consumers, including improved product labels. CLI, a pilot project launched in March 1996, invites ideas from consumers, industry, and health and safety professionals, on ways to improve the environmental, health, and safety information appearing on household product labels. The pilot project is specifically targeting home and garden pesticides and household hard surface cleaners. The project's primary goal is to ensure that consumers have and un-

derstand the information they need to make responsible product choices based on their own needs and values. In addition, EPA hopes to encourage companies manufacturing these products to use substances in their products that are less harmful to human health and the environment.[11]

Environmental management standards are increasingly used by organizations as a means of focusing and managing all of their environmental responsibilities. In September 1996, the International Organization for Standardization's (ISO) Technical Committee (TC) 207 published the first international consensus standard, ISO 14001, for environmental management systems. EPA participated actively in the development of this and the other ISO 14000 series standards. EPA is testing the utility of ISO 14001 as a vehicle for enhancing pollution prevention, compliance, and overall environmental performance. The EPA Voluntary Standards Network is the means by which the Agency participates, with full voting membership, in the U.S. Technical Advisory Group (TAG) to TC-207. Through the network, the official EPA representatives to the U.S. TAG disseminate information throughout the Agency and coordinate EPA comments on the documents.[12]

Theme 6: Develop partnerships in technological innovation with the private sector to increase industrial competitiveness and enhance environmental stewardship.

EPA is striving, through the use of voluntary partnership programs, to encourage and support private sector development of pollution prevention technological innovations. Of particular note is EPA's *Environmental Technology Initiative* program for new chemicals. The goal of this program is to identify and reduce barriers to the development, introduction, and use of safer chemicals and technologies. This project offers industry an opportunity to explore new, non-traditional ways to manage risk, as opposed to the traditional regulatory approach.[13]

Another EPA project aimed at spurring development of innovative technology is the *Green Chemistry Program,* which aims to reduce or eliminate the use or generation of toxic substances in the design, manufacture, and use of chemicals. The program supports research in environmentally benign chemistry and promotes partnerships with industry in developing green chemistry technologies. In March 1995, The *Green Chemistry Challenge* program was announced by President Clinton. This program pro-

[11] A Phase I Report on the Consumer Labeling Initiative is available on the Internet at http://www.epa.gov/opptintr/labeling/phase1; or from the Pollution Prevention Information Clearinghouse (tel: 202-260-1023, fax: 202-260-0178). For more information, contact Julie Lynch at 202-260-4000.

[12] For more information on the Voluntary Standards Network, contact Mary McKiel at 202-260-3584.

[13] EPA, Office of Pollution Prevention and Toxics. *Environmental Technology Initiative for Chemicals* (EPA 743-K-96-001, May 1996).

Green Chemistry Challenge

The Green Chemistry grant and awards program provides financial support and national recognition for research, development, and use of industrially and economically-viable chemical alternatives. Nominations for the Green Chemistry Challenge awards are made in three areas: (1) use of alternative synthetic pathways, (2) use of alternative reaction conditions, and (3) the design of chemicals that are less toxic than current alternatives or that are inherently safer with regard to accident potential. The 1996 winners of the award are:

- The Monsanto Company for creating a new "zero-waste" process for manufacturing a key intermediate in their popular herbicide Roundup®;
- Dow Chemical Company for finding a way to replace the CFCs and other volatile organic compounds in the manufacture of foam products by using carbon dioxide; and
- The Donlar Corporation for inventing two processes to manufacture polyaspartates, a polymer alternative to toxic chemicals in fertilizers that is not only biodegradable but will actually increase nutrient uptake by plants.
- Rohm and Haas Corporation, for designing its product "Sea-Nine" as a safer marine anti-foulant for boat and ship hulls.
- Professor Mark T. Holtzapple at Texas A&M University, for research in using agricultural wastes in a wide variety of products, including animal feed, fuels, and high value chemicals.

motes innovative uses of green chemistry for pollution prevention. EPA is working cooperatively with industry and the scientific community to establish this program.[14]

EPA's *Environmental Leadership Program* (ELP) supports facilities that have volunteered to demonstrate their innovative approaches to environmental management and compliance, including pollution prevention. EPA has selected 12 facilities to participate in the pilot program and will work with these facilities to study and evaluate their innovative approaches. The information collected through this program will be used as a tool to improve environmental management and compliance throughout the regulated community. The purpose of ELP is two-fold: (1) to recognize facilities that develop and implement innovative environmental management systems and "beyond compliance" programs, and (2) to work with these facilities and understand their systems and programs and to share that information with the regulated community to improve environmental management and increase compliance. In exchange for volunteering to demonstrate their innovative approaches, EPA will offer facilities several incentives, including public recognition by EPA as an environmental leader, a limited grace period to correct any violations discovered during the pilot program, and a guarantee of no routine inspections by EPA or the state.[15] Fifteen facilities participated in the pilot program, including ten private companies and two federal facilities.

Region IX's planned *Pollution Prevention Through Technology Transfer* pilot project will help test OPPT's new pollution prevention risk assessment framework, developed in an earlier OPPT/Kodak project, and will help regional industries promote facility-based pollution prevention activities.

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[14] EPA, Office of the Administrator. *Partnerships in Preventing Pollution - A Catalogue of the Agency's Partnership Programs* (EPA 100-B-96-001).

[15] EPA, Office of Compliance. *Environmental Leadership Program Fact Sheet* (April 1995).

Pollution Prevention Research in EPA's Office of Research and Development (ORD)

ORD has maintained a significant research program in pollution prevention for several years. Prior to 1994, the following were the main emphases of this research: assisting small business sectors (such as printing, metal finishing, dry cleaning) in achieving pollution reduction; developing tools (such as life cycle assessment) to analyze and measure pollution prevention potentials; partnering with industry (such as pulp and paper) in evaluating cleaner technology demonstration under the Effluents Guidelines Program; evaluating innovative waste reduction technologies (under the Waste Reduction Innovative Technology Evaluation Program [WRITE]) developed in universities, research institutes, and industry; working in partnership with other government departments in developing specific technologies or assessing opportunities for pollution prevention; and creating databases for disseminating information about pollution prevention. There was also a program to examine the socioeconomic aspects of preventing pollution. Most of these programs are still being supported; however, there has been a strategic shift in research direction, the results of which will be felt in a few years. The central theme to the strategic shift was the use of risk as a driver and motivator for doing prevention research. Thus, only the high priority problems need to be addressed first — problems in which either pollution prevention approaches will provide large environmental benefits or for which efficient tools and methods will provide knowledge and information to reduce uncertainty of prevention technologies or to lead to newer prevention approaches. An expanded grants program at ORD supports high-risk innovative pollution prevention approaches, and addresses socioeconomic issues of pollution prevention.

Current ORD research in prevention can be described in four categories:

- Development of analytical tools and methods needed to assess or measure pollution, and quantify improvements;
- Development of generic technologies that have simultaneous appeals to many industry sectors and to agricultural practices;
- Development of, in collaboration with industry, sector-specific technologies requiring systems approaches; and
- Demonstration and verification of cleaner technologies on large scales.

Analytical Tools and Methods for Pollution Prevention

Providing tools and methods that aid scientists, engineers, and technicians in choosing cleaner chemistry, materials, algorithms, design techniques, databases, and engineering methods when they design for the environment, is effective insurance that industry will of its own accord meet or exceed regulatory requirements. Examples of these tools and methods are:

- Life Cycle Assessment (LCA). The present thrust of ORD efforts is directed to making LCA affordable through a streamlined LCA methodology.
- Simulation/Design Tools. The National Risk Management Research Laboratory (NRMRL) has developed a computer-based algorithm, WAR or Waste Reduction Algorithm, that follows the concept of pollution balance, a scheme based on either pollution mass or potential environmental impact. WAR will shortly be available commercially as a new capability of Chemcad, a product of Chemstation, Inc., of Houston, Texas.
- Guidance and Design Tools. These computer-based tools (SAGE - solvent alternative guide; CAGE - coatings alternative guide; AAGE - adhesives alternative guide; and PARIS II) offer ways of selecting environmentally-preferable substitutes.
- Assessment Tools. ORD has developed guidance documents for systematically assessing pollution prevention opportunities in production, service, and maintenance facilities.
- Impact Assessment Tools. NRMRL is developing a generic program (TRACI) for the reduction and assessment of chemical impacts, which assists in providing aggregate impacts through user-provided weighing factors for various disparate impacts, such as ozone depleters and greenhouse gases.
- Control Algorithms. ORD has developed control algorithms based on fuzzy logic which allow better control of processes to minimize emissions.

Generic Process Technologies (Multi-sector)

Generic technologies have multi-sector impacts. These are products of traditional unit operations (physical changes) or unit processes (chemical changes)-based research except that environmental concerns are incorporated in the research process. Unlike the analytical tools, which are mathematics- and computer code-intensive, research in generic technologies is largely experiment-based. The following are three broad areas of particular interest:

- Green Chemistry and Green Processing. The ORD grants program, Technologies for Sustainable Development, provides significant support for a range of generic technologies from cleaner chemical or biochemical pathways to chemical synthesis or material formulation. For instance, synthesis in supercritical carbon dioxide offers certain processing advantages. Biochemical synthesis of feedstocks likewise is looked upon as a safer alternative to synthesis based on petroleum-derived feedstocks. NRMRL is evaluating innovative oxidation pathways that are environmentally benign. A large number of valuable feedstocks are oxychemicals, commercially made in harsher environments, thereby creating unwanted and toxic byproducts.

- New Materials. ORD's grants program supports developing new materials, such as benign substitutes and materials, with enhanced environmental performance.
- Separation technologies. The ORD grants program also supports research on separation technologies. Separation technologies are particularly suitable for making in-process recycle-reuse possible. As an example, consider absolute alcohol, which is made from the azeotropic composition of alcohol-water mixture. Benzene is added to the binary azeotrope and the ternary mixture is further distilled to produce absolute alcohol. With a pervaporation membrane this operation can now be done without the need of adding a carcinogenic compound like benzene. Numerous opportunities of in-process efficient separations are encountered in industrial applications. ORD is currently exploring several promising generic separation methods — membrane, adsorption, and a hybrid of the two.

Sector-specific Technology Development

ORD is following the needs of technology developments in all the CSI industries. ORD works with the Office of Water in the Effluent Guidelines Program for evaluating cleaner technologies in identified industry sectors, and has recently started working with the textile industry under the AMTEX program in developing pollution prevention technologies, such as recovering color from textile effluents and dealing with the solid waste problem.

Technology Demonstration and Verification

There are certain applications of clean technologies that need to be demonstrated or verified for performance before the technologies will be adopted for industrial applications. A small-scale application of this may be a technology for recycling chromium or nickel from electroplating baths. A large scale application may be paper pulp bleaching without using either chlorine or chlorine dioxide. To encourage wider acceptance of environmental technologies in general, ORD has formulated an Environmental Technology Verification (ETV) program, a part of which is dedicated to pollution prevention technologies.

Theme 7: Seek changes, where justified, in federal environmental laws that will encourage pollution prevention/source reduction.

The federal Pollution Prevention Act is not the only legislation with significance for pollution prevention. U.S. environmental laws have historically been oriented towards single-medium, end-of-pipe waste management solutions. Congressional response to waste management problems has been issue- and media-specific, resulting

in statutes such as the Clean Air Act (CAA), Safe Drinking Water Act, Resource Conservation and Recovery Act (RCRA), and the Superfund law.

These statutes were not designed to encourage preventive approaches, although in practice they often have that effect. For example, Superfund liability has been a long standing incentive for pollution prevention, since the surest way to avoid future liability is to avoid generating wastes in the first place. The single media approach also has its limitations. Because most environmental statutes focus on a single environmental medium or problem, they may allow for shifting of wastes between media, and not highlight the advantages of eliminating waste at the source.

The National Academy of Public Administration (NAPA) has recommended that Congress pass legislation encouraging businesses to go beyond mere compliance with EPA regulations while at the same time giving industry more flexibility in its approach to meeting or exceeding the regulations. NAPA recommends that EPA and Congress, working together, design environmental programs and regulations that permit businesses to seek their own solutions to their individual or common problems. The results of this type of legislation and regulation are lower costs with the added benefit of innovative technology as industries test new methods for achieving pollution prevention targets.

EPA's *Statutory Integration Project* came out of a recommendation by NAPA in its Report to Congress. They articulated what many recognize: namely, that EPA is fragmented by media, in part due to the statutory framework under which the Agency operates. The Senate Appropriations Committee asked the Agency to take a look at statutory integration specifically, and also asked the Agency to better integrate its planning, budgeting, and accountability practices -- a process now well under way.

EPA Administrator Carol Browner charged the Statutory Integration Task Force with taking a broad view of the topic. The group is not focused solely on investigating a complete statutory "fix," but is instead looking at a range of possibilities from a single integrated statute to replace the existing environmental laws, to incremental change working toward better coordination across statutes, to an integrating statute which would overlay existing statutes. The task force has conducted approximately 80 interviews within EPA, with industry, with the regulated community, with environmentalists, academics, and Congress. The task force is also working with Resources for the Future on a comparison of international environmental laws, and are performing a comparative legal analysis of existing statutes.

Some key points that are beginning to emerge include a set of objectives which would provide EPA with more discretion to set priorities, clearly articulate a mission and goals, and provide more flexibility to waive or adjust regulatory requirements. This project presents many opportunities to the Agency, including gaining flexibility in choosing the best authority to address a risk; functioning in a more integrated way on such things as regulation writing; operating with more consistency across authorities; and managing resources more flexibly.

This brief survey of Agency activity demonstrates how prevention perspectives and approaches have taken hold. It is not an assertion that the work of institutionalizing pollution prevention across EPA has yet succeeded. In fact, one of the most daunting tasks that has faced EPA is integrating pollution prevention into the Agency's own culture and mission. Substantial progress has been made on this task in the last six years. Throughout the Agency, EPA offices are rethinking their programs, making pollution prevention a priority rather than an afterthought. A wealth of new partnerships have been created with the private sector to develop and experiment with pollution prevention approaches. In many ways, pollution prevention has brought with it a new sense of cooperation and exploration in tackling some of the most intractable environmental problems. At this point, the Agency needs better tools to disseminate these prevention innovations across the environmental community and to measure the cumulative environmental impacts of these innovations.

In looking ahead, it is worth considering the five criteria for environmental management policies established by the President's Council on Sustainable Development in its 1995 report.[16] These criteria are aimed at enhancing the efficiency of existing regulatory systems and are a basis for future environmental approaches as well:

- *Provide Greater Regulatory Flexibility with Accountability.* The regulatory system must givecompanies and communities greater operating flexibility, enabling them to reduce their costs significantly in exchange for achieving superior environmental performance. While allowing flexibility, the system must also require accountability to ensure that public health and the environment are protected.

- *Extend Product Responsibility.* A voluntary system of extended product responsibility can be adopted in which designers, producers, suppliers, users, and disposers accept responsibility for environmental effects through all phases of a product's life.

- *Make Greater Use of Market Forces.* Sustainable development objectives must harness market forces through policy tools, such as emissions trading, deposit/refund systems, and tax and subsidy reform. This approach can substantially influence the behavior of firms, governments, and individuals.

- *Use Intergovernment Partnerships.* Federal, state, and tribal governments need to work together in partnership with local communities to develop place-based strategies that integrate economic development, environmental quality, and social policymaking with broad public involvement.

- *Encourage Environmental Technologies.* The economic and environmental management systems need to create an atmosphere that encourages innovation and the development and use of technologies that will create jobs while reducing risks to human health and harm to the environment.

[16] President's Council on Sustainable Development.*Council Report.* Washington, DC (1995). The Report is available on the Internet at http://www.whitehouse.gov/PCSD.